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CARNIVOROUS PLANT NEWSLETTER

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CARNIVOROUS PLANT NEWSLETTER

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Front cover: *Utricularia longifolia*. Photo by Barry Meyers-Rice.

Rear Cover: *Sarracenia psittacina*. Pastel and color pencil work by Marcia R. Cohen.

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Views expressed in this publication are those of the authors, not necessarily the editorial staff.

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ICPS Seedbank

C/O Thomas J. Johnson, P.O. Box 12281, Glendale, CA 91224-0981

11/08/94 Update

- | | |
|--|--|
| <p> <i>Capsella burso-pastoris</i>
 <i>Darlingtonia</i>
 <i>Dionea muscipula</i>
 <i>Drosophyllum</i> (3)
 <i>Genlisea hispida</i> (2)
 <i>H. heterodoxa</i> (4 seeds/pkt, 1/customer)
 <i>N. alata</i> (10)
 <i>N. maxima</i> X <i>max</i>(?) <i>Sulawesi</i> (10)
 <i>N. ventricosa</i> #1
 <i>N. ventricosa</i> #2
 <i>N. vieillardii</i>
 <i>P. vulgaris</i> <i>Swiss Alps</i>
 <i>P. vulgaris</i> <i>Jura Mts</i>
 <i>Utricularia calycifida</i> (6)
 <i>S. alata</i> <i>Angeline CTY, Texas</i>
 <i>S. alata</i> <i>Vernon Parish</i> (4)
 <i>S. alata</i> <i>Mississippi</i> (1)
 <i>S. flava</i>
 <i>S. flava atropurpurea</i> (1)
 <i>S. flava</i> <i>Ben Hill Cty GA</i>
 <i>S. flava</i> <i>Ocilla GA</i>
 <i>S. flava</i> <i>red tube</i> (2)
 <i>S. flava</i> <i>Fitzgerald GA</i>
 <i>S. flava</i> <i>veined Fitzgerald GA</i>
 <i>S. flava</i> <i>Irwin Cty GA</i>
 <i>S. leucophylla</i>
 <i>S. leucophylla</i> <i>Gulf Breeze, FL</i>
 <i>S. minor</i> <i>Ocillo GA</i>
 <i>S. minor</i>, <i>Ben Hill Cty GA</i>
 <i>S. minor</i> <i>Irwin Cty, GA</i>
 <i>S. minor</i> <i>Fitzgerald GA</i>
 <i>S. minor</i> <i>Flor. Giant</i> (3)
 <i>S. oreophila</i> 93 seed
 <i>S. psittacina</i> <i>Fitzgerald GA</i>
 <i>S. psittacina</i> <i>Ocillo GA</i>
 <i>S. purpurea</i>
 <i>S. purpurea</i> <i>purp heterophylla</i> (13)
 <i>S. purp venosa</i> v. <i>burkei</i>
 <i>S. rubra</i>
 <i>S. rubra</i> <i>jonesii</i>
 <i>S. X</i> (<i>alata</i> X <i>psit</i>) <i>X alata</i> (5)
 <i>S. X catesbaei</i> (1)
 <i>S. X chelsonii</i> (2)
 <i>S. X leuco</i> X <i>alata</i> (1)
 <i>S. flava</i> X <i>purp</i> X <i>flava</i> X <i>self</i>
 <i>S. minor</i> X <i>psit</i> <i>nat'l hybrid</i>
 <i>Fitzgerald GA</i>
 <i>S. mitchelliana</i> X <i>psit</i> X <i>alata</i>(1)
 <i>D. aliciae</i>
 <i>D. anglica</i> <i>Hawaii</i> (8)
 <i>D. auriculata</i> (5)
 <i>D. auriculata</i> <i>NZ</i> (7)
 <i>D. binata</i> (1) </p> | <p> <i>D. binata</i> <i>Haraki Plain NZ</i>
 <i>D. binata</i> <i>North Plains, NZ</i>
 <i>D. burmannii</i>
 <i>D. burmannii</i> <i>Berwah, QLD</i> (6)
 <i>D. callisto</i> (3)
 <i>D. capensis</i>
 <i>D. capensis</i> '<i>alba</i>'
 <i>D. capensis</i> '<i>Narrow Leaf</i>'
 <i>D. capensis</i> <i>red</i> (2)
 <i>D. capillaris</i> (4)
 <i>D. coccicaulis</i>
 <i>D. dielsiana</i> (3)
 <i>D. filiformis</i> <i>filiformis</i> <i>NJ Pine Barrens</i>
 <i>D. glanduligera</i>
 <i>D. indica</i> '<i>white</i>'
 <i>D. intermedia</i>
 <i>D. intermedia</i> '<i>Carolina Giant</i>'
 <i>D. intermedia</i> '<i>Brunswick, N.C.</i>'
 <i>D. intermedia</i> '<i>Pine Barrens</i>' (6)
 <i>D. linearis</i> (1)
 <i>D. madagascariensis</i> (5)
 <i>D. montana</i> <i>Caraca</i> (3)
 <i>D. peltata</i> <i>grn rosette Molgoa, NSW</i> (8)
 <i>D. peltata</i> <i>Kandos Area</i>
 <i>D. peltata</i> <i>NZ</i> (3)
 <i>D. planchonii</i>
 <i>D. ramellosa</i> (5)
 <i>D. rotundifolia</i>
 <i>D. rotundifolia</i> '<i>Bruce Penn, CAN</i>' (1)
 <i>D. rotundifolia</i> <i>Bloomsburg, PA</i>
 <i>D. rotundifolia</i> '<i>Haines, AL</i>' (12)
 <i>D. rotundifolia</i> <i>Oregon</i>
 <i>D. rotundifolia</i> <i>Thomas Lake, WA</i>
 <i>D. rotundifolia</i> '<i>S. Bohemia Czech Rep.</i>'
 <i>D. sp. botswana</i> (3)
 <i>D. spatulata</i> (5)
 <i>D. spatulata</i> <i>Kanto</i> (2)
 <i>D. spatulata</i> '<i>North Island</i>', <i>NZ</i> (1)
 <i>D. spatulata</i> <i>rotundate</i> (2)
 <i>D. spatulata</i> '<i>New Zealand</i>' (1)
 <i>D. sp. Auyan Tepui</i>
 <i>D. sp. 'Magaliesburg'</i> (10)
 <i>D. trinervia</i>
 <i>D. whitakeri</i>
 <i>D. X dielsiana</i> X <i>sp. transvaal</i> (3) </p> |
|--|--|
- PLEASE INCLUDE A SELF-ADDRESSED-STAMPED ENVELOPE WITH ALL U.S. CORRESPONDENCE (\$29 Postage for seedlist; \$.39 when ordering seed) \$1.00/packet. Please list substitutes () indicates number of seed packets if under 15 NOTE: This list is current as of 11/08/94. Do not order from this list; request a current update.

THE NEXT MEETING OF THE LOS ANGELES CARNIVOROUS PLANT SOCIETY IS SCHEDULED FOR SATURDAY, JANUARY 21, 1995.
FOR INFORMATION, CALL TOM JOHNSON AT (818) 248-1623.

Literature Review

Antor, R.J. and M.B. Garcia. 1994. Prey capture by a carnivorous plant with hanging adhesive traps: *Pinguicula longifolia*. *Am. Midl. Nat.* 13 1:1 28-135.

Pinguicula longifolia endemic in the Pyrenees. A very useful aspect of this study is (though rarely done!) that an estimate of local insect population at plant level was made by trapping. Unlike other pinguiculas, this species' diet consisted mostly of flying insects, mainly diptera. The authors postulate that there may be a specific attraction feature of the leaves involved, and the fact that the leaves of these plants growing on rock walls hang pendulously.

Degreef, J.D. 1994. Carnivorous plants. (See address below). 28 p.

This handsome little 28 page booklet is a publication of the Belgian CP society called Drosera V.Z.W. It features 36 full color mostly excellent photos of various CP, common and rare, propagated and field shots. There are also 13 line drawings lining the insides of the covers featuring microscopic aspects of CP and hard to photograph things such as genlisea traps. The text is well done, although somewhat hurried due to space limitations. There are few editorial errors, mostly desktop publishing program errors where footnote numbers and exclamation points appear on their own lines at the ends of some paragraphs.

Writing is generally clear. There are a few concept errors. There is the old problem of "primitive vs. advanced", a concept that has largely been abandoned by most evolution specialists. Instead, specialized vs. non specialized, more adapted vs. less adapted, etc. are preferred. This is because the so-called simpler organisms (simple itself being anthropocentric) are actually highly evolved and adapted to specific habitats many times. Thus heliamphoras and *Sarracenia purpurea* are probably not primitive but are highly adapted and possibly evolved to fit specific habitats. In fact, since overhanging hoods are the majority trait in sarracenias, this is more likely a primary feature rather than an "advanced" one comparatively to the erect hood of *S. purpurea*. Also, it has been shown that *S. purpurea* does not secrete enzymes. Genlisea spp. are not sucking traps in the same sense as utricularias. At most there seems to be a gentle current flow guiding potential prey up the arms into the utricle. Finally, illustration 4.4 is not a catopsis as the legend says, but is *Brocchinia reducta* as is mentioned later in the text.

It is difficult to say for whom the booklet is actually aimed, although I am pleased to have a copy I believe the intent is for the curious newcomer to CP, and possibly journalists. However, even the experienced CP person will want a copy to complete their library and for the photos; and I did learn about the algae that consume bacteria by phagocytosis when phosphate levels get low in their waters.

Conveniently, the booklet is published in four languages: Flemish, German, French and English. Specify which version you want. The cost is \$8 US, postpaid airmail, and can be ordered from Drosera V.Z.W., Plantentuin Universiteit Gent, K. Ledeganckstraat 35, B-9000 Gent, BELGIUM.

Freedman, B. et. al. 1992. The thread-leaved sundew, *Drosera filiformis* in Nova Scotia: An assessment of risks of a proposal to mine fuel peat from its habitat. *The Canadian Field Naturalist* 106:534-542.

In the northeast, *Drosera filiformis* has a rather disjunct occurrence due to subsidence of the former coastal plain extending originally from the present New

Jersey pine barrens, over Long Island and into the Canadian maritime provinces. *D. filliformis* was found in only four raised bogs in Nova Scotia, these being in close proximity and containing from single thousands to tens of thousands of individuals. A proposal to mine peat for fuel in some of these locations posed an immediate threat to the plants. The authors did studies of numbers and habitat, and produced the rare result of actually blocking peat mining in these areas. In addition, it was shown that adjacent water draw down would also have been disastrous.

Lowrie, Allen. 1994. *Drosera ordensis* (Droseraceae), a new tropical species of carnivorous plant from northern Australia. *Nuytsia* 9:363-367.

This new species is closely related to *D lanata* in the petiolaris complex, and was found near Kununurra, Western Australia. It is fibrous rooted and grows in sandy soil that remains somewhat more moist for longer periods of time. The species seems quite common in the immediate area. The paper includes a key for the petiolaris complex and a plate of specimen line drawings of plant parts.

Miller, T., et. al. 1994. Intraspecific and interspecific competition of *Wyeomyia smithii* (Coq.) (Culicidae) in pitcher plant communities. *Am. Midl. Nat.* 131:136-145.

This is a paper of negatives, the only positive finding being that larger mosquitoes tended to inhibit small-mosquito growth both in pitchers and in containers in the growth chamber. There apparently is no ecologic succession of inquilines in pitchers and little to no other effect of various organisms, pH and pitcher fluid volume. The pitcher plant species was *Sarracenia purpurea* in northern Florida.

Mitchell, R.S., et. al. 1994. *Utricularia inflata* Walt. (Lentibulariaceae), new to New York State. *Bull. Torr. Bot. Club* 121:295-297.

The three authors independently found *U. inflata* at Spruce Pond in Orange County for the first time in New York State. The species had been found in Massachusetts several years previously. The species sister species, *U. radiata*, has been found regularly into New England, but *U. inflata* usually occurs no farther north than New Jersey. The paper also discusses the history of the two species, confusion in differentiating the two, and other factors. Vegetatively, the species occurs throughout the approximately five acre pond, and forty inflorescences were noted the season of discovery. The question of whether the plants had not been noticed before and were always there (perhaps had never flowered or been seen by knowledgeable people during flowering), or are recent introductions through one means or another.

Williams, S.E., et. al. 1994. Relationships of Droseraceae: A cladistic analysis of rbcL sequence and morphologic data. *Am. J. Bot.* 81:1027-1037.

In addition to using rbcL data, the authors also use selected morphological data (e.g. pollen characters, leaf stipules, flower styles, etc.) in a unified study of cladistic analysis, resulting in a parsimonious tree of relationship. The authors conclude that *Dionaea* belongs in the family Droseraceae rather than one of its own. Also, *Drosophyllum* is the least related genus in the family, just below *Dionaea*. The species *D. regia* is just above *Dionaea*, but the rbcL technology loses its sensitivity below the genus level. Whether morphology increases sensitivity is problematical. The family is also related to others such as Nepenthaceae, and in terms of non-CP genera as well for family and order relationships, where rbcL itself has found greatest usefulness so far.

SOUTHEASTERN SECTION MEETING — SEPTEMBER, 1994

by

Don Schnell, Coeditor

The first meeting of the Southeastern Section of ICPS was held at the Atlanta Botanical Gardens on 24-25 September 1994. Attendance was about 50 with folks attending from as far away as Washington state and the Los Angeles area of California! At the outset, we all appreciate the excellent hospitality of the Garden and Ron Determann and Ron Gagliardo. They were superb hosts and looked after our every need.

Ron Gagliardo opened the meeting and welcomed us bright and early Saturday morning. Ron is soon to elevate to curator of tropical plants but will continue with tissue culture as well. He outlined our schedule.

Ron Determann followed with mention that one of the missions of the Garden is conservation. He outlined the efforts toward this end with some of our native plants, including *Sarracenia purpurea* on private lands in north Georgia; saving and propagating plants of *S. rubra* ssp. *jonesii* from a threatened situation on private land in North Carolina; propagation from material of *S. rubra* ssp. *alabamensis*; propagating plants of *S. rubra* from Taylor County, Georgia; and working with *S. oreophilla* from northern Georgia. All of this work involves propping by seed germination, tissue culture and growing plants to maturity in the greenhouse to be replaced in suitable habitat in the wild. They are also working with endangered non-CP, such as *Helonias bullosa*.

Ron Gagliardo continued with mention that tissue culture plants seem more exuberant and grow faster and sturdier even after removal from the agar to soil. They are also working with collecting and propping the *Dionaea* variants such as all red and the various tooth anomalies. Ron also mentioned that plants started in tissue culture seem more amenable to growth in ordinary greenhouse temperatures, such as *Heliamphora* which grows better in warm greenhouse situations if started from tissue culture, and plants of these are happily growing in the Tucson and Miami areas.

Larry Mellichamp spoke next on the subject of sarracenias. He first outlined the various habitats from northern sphagnum bogs and fens to southern seeps and savannas, including wet Gulf coastal savannas. He discussed theories of evolution of the new world pitcher plants, possibly emanating from *Heliamphora* in South America into *Darlingtonia* (west) and *Sarracenia* (east). He also showed a photo of the peculiar *Codeaia variegata* "appendiculata", a croton with a peculiar terminal leaf appendage that looks like an incipient *Nepenthes* pitcher. Next, he presented a series of excellent slides of various *Sarracenia* species in the field, commenting on such things as variability, habitat and conservation concerns. There was a good series of photos of various inquilines. Larry concluded with a discussion of his work in producing artificial sarracenia hybrids, with a view to selecting those that seemed most horticulturally useful for ultimate tissue culture propagation one day so that they may be widely distributed. Larry also mentioned that he had found ORTHENE (liquid) to be perfectly safe to use diluted according to label to spray adult or seedling pitcher plants to kill pitcher distorting thrips and other small pests. The spray seems perfectly safe for droseras, utricularias and pinguiculas as well.

Don Schnell followed with a talk on utricularias, first discussing the anatomy of the trap and various theories of function. As he spoke, various terminology was clarified. The first part of the talk dealt with differentiation of various difficult US species, such as *U. inflata* and *U. radiata*, recent name changes, rarer US species such as *U. simulans*, and comments on habitat. There then followed a series of slides on non-

US species he was growing or had grown, such as *U. humboldtii*. Finally, he showed a brief series of informal slides of his greenhouse to demonstrate growing conditions and the concept that utricularias often did better if left to "run" from pots into surrounding tray water, or to other pots of different genera.

Following a box lunch out on a terrace overlooking the native plants garden, we were treated to tours of the conservatory areas, including the prop greenhouses thoroughly enjoyed by all. I was impressed with the general plant knowledge and wide plant interests of most of our attendees.

The first afternoon speaker was Bill Scholl who showed an excellent selection of Venezuelan Tepui slides. He mentioned that five days after the meeting he was off to Venezuela again. He discussed the many trials and tribulations of hiking to and tip tepuis, including altitude and rough country with heavy packs, fast streams, rains every night until noon the next day (this during the "dry" season!). Little sleep was had due to winds and the all night rains. He commented on the paucity of insects (prey) and possible pollinators on top of the tepuis, and seedpods did seem to contain few seeds. He also showed many of the other interesting plants in addition to heliamphoras.

Cliff Dodd followed with a very good presentation of nepenthes, both as he was growing them and slides from various sources showing many native areas as well. Throughout, he commented on the nomenclatural problems that plague the genus. He grows plants in both a warm greenhouse and an air conditioned one to accommodate the upland species in the Daytona Beach area. The audience was particularly taken by an excellent, huge *N. lowii* he was growing with loads of upper pitchers. The hairs under the lid of the lower pitchers exude a cheesy, foul smelling substance that he at first thought was pathogenic, but later realized it was to probably attract prey as a



Back row: Jim Powell, Bob Sarcolotto, Cliff Dodd II, Kyle Rollins, Brad Wilson, Joe Cumbee, Todd Lesseigne, Tommy Truman, Ron Determann, Mike Levy, Ron Gagliardo, Arthur Lauffenburger, Michael W. McCaffery, Bruce Bednar, Robert Church, Bob Hanrahan, Chet Buell, Donald E. Schnell, Craig Moretz, Andy Baldwin, Alex Soloman, Dave Crump, Bryan Fitzgerald, Manny Herrera, Clyde Bramblett, William Tanneberger.

Middle row: Bill Nethery, Bruce Dudley, Jim Zielinski, David Bressler, Randy Troup, Darwin Thomas, Cynthia Van Der Wiele, Dave Evans, Joey Meyers, Jay Smith, Brian Cochran.

Front row: Ginger Denmon, Kevin Snively, Ozzie Johnson, Ed Munn, Jeff Welch, Tom Johnson, Carl and Sherry Taylor, Henning von Schmeling, Steve Baker, Larry Mellichamp, Bill Scholl.

Not Pictured: Marcia Cohen, Tom Hayes, Joby Evans.

potential foodstuff. It was mentioned that Iowii upper pitchers are probably so shaped with the spoon shaped lid thrown so far back to act as water traps. He mentioned that a compound called DOMAIN was very safe and effective for treating the organisms causing the red spotting of nepenthes leaves. However, it is very expensive. He is also working with alternative potting media such as carefully rehydrated silica gel and rock wool. He concluded his program with a few slides of excellent examples of *Heliamphora* he was growing.

Brian Cochran followed with his method for germinating *Byblis gigantea* and the difficult variety of *B. liniflora*. Recent work indicates that there are at least three forms of *B. gigantea*, one growing to nearly three feet tall. Brian prepares a solution of gibberellic acid by dissolving 250 mg in 200 ml of water and letting it set for 24 hours. Soak the seed for 24 hours in this solution. Sow the seed on milled sphagnum, pushing the seeds slightly into the medium, and add a few drops of fungicide such as CHINOSOL or SUBDUE. Place under fluorescent lights in a terrarium and germination should occur in about 10-14 days. The seedlings are then carefully (do not bruise or break delicate long roots) into a mix of equal parts of perlite/peat/sand. Use more fungicide to continue to discourage damping off. Brian presented a very neat album of photos as case histories for each variety he tried and the results. One comment from the audience indicated that recent Australian research discloses that the previously touted method to germinate seed of the this genus using burning paper over the seed sown in the pot succeeds not by producing heat that stimulates germination, but that the smoke contains chemical compounds that stimulate germination. Some people on the west coast have been using the commercial compound SUPER-THRIVE, made up according to instructions on the bottle, essentially as a substitute for the gibberellic acid of this method. Coincidentally, when your reporter returned home at the conclusion of this conference, I found a nice set of recently germinated seedlings set out with the SUPER-THRIVE method.

The last formal presentation, on Sunday morning, was an interesting account by Henning von Schmeling of how German commercial CP grower Thomas Carow and his partner grow CP in northeast Bavaria. While Carow has a personal collection, the main thrust of his rather large setup is production for the wholesale market in Germany and Europe. His operation is on leased land since land in Germany is very expensive (spoken of in terms of square meters instead of acres as in America) and rarely sold. He had several greenhouses in a line with a headhouse, and many cold frames. All plants are grown and set in clay pots—German people prefer them and do not accept plastic. The soil medium is peat and perlite for everything. No sphagnum is used since sphagnum is an endangered genus in Germany. Carow contracts out for tissue culture and receives the material in flat plastic containers of agar. These are potted out, grown to suitable sales size, and sold. Space is at such a premium that the greenhouse operation is in three layers. The under surfaces of the main benches are all fitted with fluorescent lights so plants may be grown underneath on the floors. Then, in addition to the main bench level, there is a half bench up on the glass wall above the main bench throughout. There is much cloudiness and haziness in Bavaria, and generally cool weather so fungus disease is a real problem. All plants are sprayed regularly with a fungicide. Henning showed slides of tray after tray on bench after bench of various CP, particularly impressive being the Mexican pinguiculas and massive *Heliamphora* production. Conspicuously absent was *Darlingtonia*. Carow is able to grow his own plants to nearly three feet tall in the very suitable climate, but production always fails with this genus at the potting stage. Plants are sold relatively cheaply and with full realization that nearly all will be dead in four weeks or less in their new homes. The public apparently buys out of curiosity and for the novelty. Mexican pinguiculas stand the best chance since they can be grown as windowsill

plants. I thought it was especially interesting to see heliamphoras and nepenthes, so coveted here, being sold by the hundreds to die. But he always has his parent plants so nothing is really lost since production is strictly commercial.

After some business matter discussion, the plant auction took place and was very successful. Plants donated by attendees were sold with precedes going towards next year's meeting.

The 1995 southeastern meeting will be hosted by Larry Mellichamp at the University of North Carolina in Charlotte, the dates being 22-24 September 1995. Mailings will be sent well ahead, and we look forward to seeing everyone again next year! Remember that the meeting is open to anyone in the CP world.

BYBLIS - A BOTANICAL PROBLEM ONCE AGAIN

by Miloslav Studnicka,
Botanic Gardens, Purkynova 1,
460 01 Liberec, Czech Republic

More attention is being given to this genus at present time, because very interesting and major differences among various populations of the species *Byblis liniflora* have been claimed (Meyers-Rice 1993). For instance, I can confirm the statement, that *B. liniflora* subsp. *occidentalis* Conran et Lowrie is autosterile. The mechanism of autogamy, which can be observed in the typical *B. liniflora* (fig. 1), does not work in the subspecies *occidentalis*.

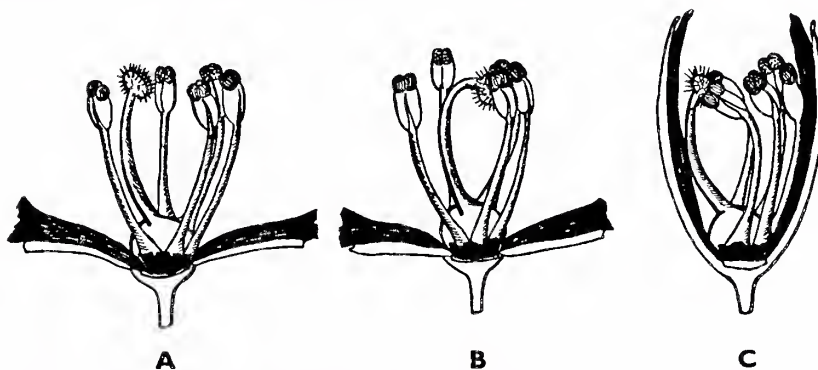


Fig. 1.- Pollination in typical *Byblis liniflora*. A - a freshly opened flower in the morning, B - a moment of autogamy in the afternoon, C - autogamy inside a flower-bud, if weather is unfavourable (cleistogamy). Notice the different function of stamens in B and C.

The genus has been fairly intensively studied previously because its systematic position had been uncertain. It has been placed in the families Pittosporaceae, Droseraceae, and or Lentibulariaceae (Lecoufle 1990: 86). Bearing sympetalous and at least suggestively zygomorphic flowers, *Byblis* can be related to the last family. An important article has been published supporting the idea. Research data on embryo sacs, ovules, and glands in *Byblis gigantea* indicate that *Byblis* could be a primitive ancestor of Lentibulariaceae (Lang 1901). A Czech botanist Prof. Karol Domin (of the Charles University in Prague) has studied particular characters of *Byblis* and



Fig. 2.- An enlarged tip of a growing leaf of *Byblis liniflora*, equipped with fully developed sessile & stalked secretory glands.



Fig. 3.- A lengthwise section of a leaf tip in *Byblis gigantea* with numerous tracheids.

subsequently he established the generally accepted family Byblidaceae (Domin 1922).

Physiology of *Byblis* seems be less interesting than phylogeny and taxonomy. In spite of this, let me discuss a function of a very remarkable organ in *Byblis*. It is a leaf tip which has similar morphology and anatomy in both species of *Byblis* (fig. 2 and 3). The leaf tips are club-shaped and they are equipped with large stalked glands, sessile glands and stomata. Inside there are numerous tracheids, which are linked to vascular bundles of the leaf (fig. 4). Meristem (an actively growing primary tissue region) is inserted between differentiated tissues of the tip and the mature part of the leaf (fig. 5). it is so-called intercalary meristem. What special functions are performed by the

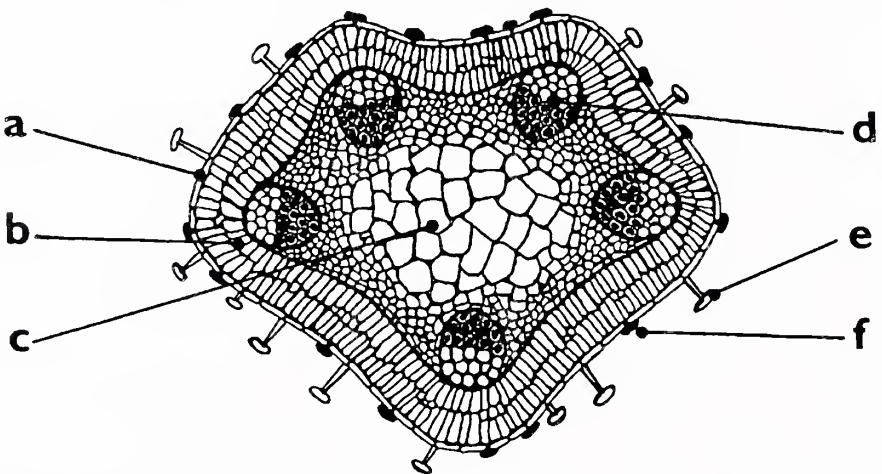


Fig. 4.- Vascular system of a leaf of *Byblis gigantea* (a transverse section). a - epidermis, b - green parenchyma, c - water-storage tissue, d - vascular bundle, e - stalked gland, f - sessile gland. (Drawings 1 and 4 by Regina Novotna.)

described leaf tips? It stands to reason that they take part in the water regime of the plant. The leaf tip is an organ established to maximize water vapour or discharge (Lang 1901).

According to my hypothesis, the leaf tip supports transpiration so that above all the growing meristem is substantially fed. Gardeners leave a so-called "shoot of drought" in grafted trees for the same purpose (fig. 5). This is a logical explanation, but an experimental proof is required.

Literature

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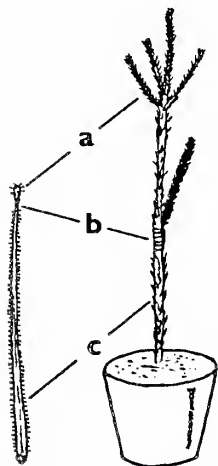


Fig. 5.- Analogy between functions of the leaf tip in *Byblis gigantea* and the "shoot of drought" in a grafted fir tree. a - water expelling apices, b - areas of actively growing tissue, c - mature basal parts. Both apices support transport of nutrient solution to growing tissues by means of expelling water by transpiration.

THE LIMONIUM PEREGRINUM OF CAROLUS CLUSIUS

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The history of the introduction of *Sarracenia* from North America to Europe has been examined by J.D. Hooker (1874: 484; 1875: 6) who is followed by Lloyd (1942: 18), Slack (1979:26,46) and Juniper *et al.* (1989: 14). All are agreed that the first description and plate to be published were by Clusius (as *Limonium peregrinum*/congener, 1601:lxxxij), apart from the illustration of *S. minor* Walt. by L'Obel in his *Nova Stirpium Adversaria* (1576). Slack (1979:49) and Cheek (1994) show that the work of Clusius concerns the northern subspecies of the most widespread species, that is, *Sarracenia purpurea* L. subsp. *purpurea*, as was first pointed out by Wherry (1933: 5).

In order to conserve existing usage of nomenclature for the subspecies of *S. purpurea* (Cheek, 1994; Cheek *et al.*, in press), the plate of Clusius has been proposed as the new nomenclatural type of the species, and incidentally that of the genus *Sarracenia* L. and the family Sarraceniaceae.

Since the plate and text of Clusius are thus not without interest, and since it has not been possible to trace any reproduction or translation of this text or plate other than the original, they are presented below, together with some biographical notes on Clusius. For the sake of exactness, our translation is as literal as possible. This has resulted in some quaint sentences but should give the reader a flavour of the original. The plate around which the original text was arranged is reproduced in Fig. 1.

"This plant is very exotic and elegant, whose picture and dried leaf, from Paris was sent all the way to me by that humane fellow and most diligent pharmacist Claude Gonier, who had received it dried, and mutilated with a broken stem, from Lisbon, just as he was writing to me.

This plant, Claude says, has in fact nine, ten or more leaves sprouting from the top of the head of the root. Their shape is different from the leaves of all the plants that I have ever seen, because they are hollow, like the flowers of *Aristolochia*, with a swollen belly as if endowed with a dewlap, the back bulging, with its lowest part narrow and gradually increasing into a wide area, with the topmost part wider still and open, and as if shaped into a semi-circle. All the leaf is hard and as if resembling skin; the uppermost part of the leaf is open, internally distinct [distincta - perhaps 'separated?'] with many thick veins from dark purple [to other colours?]. Between the leaves the lower part of the broken stem projected, as the picture showed. The root is not markedly big and is divided into a number of branches. What kind of flowers, or what kind of seed it brings forth, has not been written down, its countries of origin have not been indicated, neither has it been noted at what time it produces flowers.

Moreover, to what class of plants I should refer this plant I cannot say. Of the leaves however, the thickness or (if it is permitted to say so) the fleshiness, and other well known characteristics virtually compel me to conclude it should be compared to some genus of the *Limonium* of Matthioli. And it will be possible (in my opinion) to be named for the meantime, *Limonium peregrinum* until it finds another name more appropriate, from a more careful observation of the entire plant.

But in order that it should not fail to have a place in our Observations of Plants, we have postponed its history to the back [lit. heel] of volume four."

Clusius begins with a note on the origin and nature of the material he had to hand, then goes on to describe it with great verve, concluding with the lamentable absence of flower or fruit which disables him from drawing any conclusions on its taxonomic affinities. Clutching at straws, he speculates that maybe it is congeneric (hence 'Limonium congener') with the *Limonium* of Mattioli, on account of the thickened leaves. Clusius gives it the name *Limonium peregrinum*, the foreign *Limonium*. Previously (Juniper *et al.* 1989)

Mattioli was an Italian botanist and physician who was about 20 years senior to Clusius. His *Limonium* (Mattioli 1560: 496) is the same as ours today, based on *Limonium* Mill., that is the Sea Lavender: quite unrelated to *Sarracenia*. Clusius however, goes out of his way to qualify his opinion saying that this name is provisional until complete material is available which will allow a more appropriate name to be bestowed upon the plant. Most recent authors have not appreciated this: ..'It seems curious today that he should have classified it as one of the totally dissimilar Sea Lavenders'(Slack, 1979: 46).

Carolus Clusius is the Latinized form of Charles de L'Escluse, also known as l'Escluse. He was born in Arras (now in France, then unaligned) on 19 February 1526, and died in Leiden, Netherlands, in

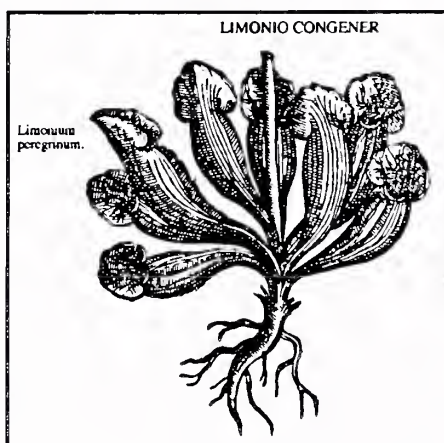


Fig. 1. A copy of the original plate in the *Rariorum Plantarum Historiam* of Clusius (1601).

1609. A survey of his life amounting to one and a half pages appears in the Dictionary of Scientific Biography (Gillespie, 1973, 8: 120-121) from which the information here is largely taken. Some additional information published since appears in Aumüller (1973), but the most detailed account, amounting to 445 pages, is by Hunger (1927), in Dutch.

As the elder son of a rich and respected family, Clusius was well educated. He trained as a lawyer and became interested in botany in 1551 when he collected plants for his teacher, a Professor at Montpellier. His earliest works are translations and expansions of Latin texts into French, but also from other languages into French and Latin, usually biological works, largely botanical. His first original botanical work was an account of the plants of Spain based on his travels there and he repeated this success with an account of Hungarian plants. In 1593 he was appointed to the Chair of Botany at the University of Leiden until his death in 1609, by which time that place had become the botanical centre for the whole of Europe. Clusius had many correspondents apart from Claude Gonier from whom he derived plants and information. The *Rariorum Plantarum Historiam* included many other foreign plant species besides *Sarracenia* including the potato of which he gave an early description and propagated as early as 1588. Clusius was amongst the pioneer botanists who broke away from merely copying the text and plates of the ancient Greeks and Romans, as if they were sacrosanct. As his description shows, he was an acute observer above all else. He didn't confine himself to botany. He has been characterized as "one of the first outstanding figures in early Mycology" (Aumüller, 1973b). The most well-traveled botanist of his time, he recorded and translated Roman inscriptions wherever he roamed, and the quality of this work has been praised unanimously in later centuries. His fluency in both written and spoken Latin is mentioned in biographical works. The text that we have translated gives evidence of his skill in this direction.

Where did the specimen and plate come from? Stafleu and Cowan (1976: 513) note that "herbarium specimens documenting Clusius" descriptions are extremely rare. The Bauhins (BAS) received Clusius' material and so did Platter (BE) but in the absence of annotations the specimens are difficult to locate." So the prospect of finding clues from the specimen is not enticing. We have investigated two works on his correspondence, that of Conti (1939) and Roze (1899), but neither mention anything about his correspondent Claude Gonier, who sent the material to him. So we have lost the opportunity of pursuing the correspondence with Gonier to see if by a remote chance he later did trace the origin of the *Sarracenia* specimen. We are left with the information given in the text and plate, and our knowledge that these represent a specimen of the northern subspecies of *S. purpurea* which occurs from New Jersey to Nova Scotia and Newfoundland, and that to have been in Clusius' hands by this circuitous route in time for analysis and publication in 1601, the material must have been collected some years previously, quite possibly within a century of Columbus' discovery of the New World in 1492. European activity in the Americas was then concentrated on Central America and the Caribbean, not sites for our plant. Cabot, from Bristol, reached Canada *en route* for the Northwest Passage in 1497 and may have had the opportunity to collect, though I have found no record. If he did so it is strange that none of his collections came to light earlier. He seems an unlikely source. The *Mayflower* and the Pilgrim fathers who heralded the main wave of settlement had yet to reach North America and though Sir Walter Raleigh founded the ill-fated colony of Roanoke in 1585, this was in Virginia, where only the southern subspecies grows: not the subject of Clusius' plate. Further north, in the range of our plant, colonization in New Jersey began with Henry Hudson in 1609 (too late). The first permanent settlement north of Florida was made by the French under Chauvin in Nova Scotia in 1605 (too late for any specimen to reach Clusius for 1601). The most likely source of our

plant was someone who accompanied Cartier's repeated visits to what is now Quebec between 1534 and 1541 (Rousseau, 1956: 150). The colony was abandoned, apart from two visits, until the early 1600's. It is known that live plant material, such as *Thuja occidentalis* was introduced to Europe as a result of this visit, so why not a dried specimen of *Sarracenia*? The interval of 60 years is not easy to explain, but unsorted specimens can wait for this duration to come to light even in this century. Even more difficult to explain is the port of entry into Europe, Lisbon. The Portuguese are famous explorers, but were not famous for their exploration of North America and certainly not for bringing plant specimens from there. Will we ever discover by whom, when and where was Clusius' *Limonium peregrinum* collected?

Acknowledgments

We thank the staff of the Library of the Royal Botanic Gardens, Kew, for their assistance, Dr Frodin for pointers on early botany in North America, Dr Beentje for information on the politics of the nascent Netherlands and Vanessa Sequeira for investigating the explorations of the early Portuguese explorers.

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ANNOUNCEMENT

Phil Sheridan and Bill Scholl are pleased to announce they will be hosting the fourth annual eastern CP meeting from June 2 - 4, 1995 and invite you to attend. The convention will be held at their botanical preserves in rural Caroline County near Fredericksburg, Virginia. These properties contain some of the best *Sarracenia* exhibits and wetland habitats in the region.

We would like to solicit individuals for poster sessions and talks. Poster sessions involve creating a display of your research or special subject for general viewing and discussion. Poster sessions and talks will be held at the Sheridan residence.

Most of the daylight hours in past CP meetings have been spent in prepared talks and we would like to save these presentations for the evening. In this manner more time can be spent examining and discussing the extensive plant collections and natural areas of the area.

Here is the agenda:

Friday Evening

6:00 P.M. until ... Arrival of participants and cookout.

Saturday

8:30 - 10:00 A.M. Late arrivals, check in, coffee and country breakfast.
10:00 - 1:00 P.M. Viewing of Sheridan and Scholl collections and natural areas.
1:00 - 5:00 Plant swaps and poster sessions.
5:00 - 8:00 Break for dinner. You can eat locally or join us for communal cooking.
8:00 until ... Talks and CP bedtime stories.

Sunday

9:00 - 11:00 A.M. Coffee and donuts, business meeting.
11:00 Adjourn meeting.

We have a limited number of free rooms for individuals to stay in and unlimited primitive camping. The area has a number of hotels in a 6 - 20 mile radius for those seeking more private quarters.

We request a registration fee of \$20.00 by May 15, 1995 which should cover meals, refreshments and registration packet. Those experiencing financial or transportation problems are invited to contact one of the hosts for assistance. We do ask for volunteers to help with cooking and cleanup. We look forward to seeing you in June.

Your Hosts:

Phil Sheridan
Biology Dept.
Virginia Commonwealth Univ.
816 Park Avenue
Richmond, VA 23284
W (804) 828-1562
H (804) 359-6439

Bill Scholl
11420 Winterpock Rd.
Chesterfield, VA 23832
H (804) 739-2390
W (804) 233-9674

NEPENTHES, HELIAMPHORA AND OTHER CARNIVOROUS PLANTS PRICELIST 1995

Andreas Wistuba; Mudauer Ring 227; 68259 Mannheim; Germany; Tel.: +621-705471; Fax: +621-711307

Inet: a.wistuba@carnivor.rhein-neckar.de

Plants will only be sent from May to November. @ = Might become available in 1995 (enquire!)

All plants are propagated in-vitro. They measure 5-10 cm in diameter (Nepenthes) or 5-6 cm in highth (Heliamphora). All plants are well established to greenhouse conditions. Please note that all prices are in DM (Deutsche Mark).

Nepenthes			
-alata	20	-veitchii (Batu Lawi, Highland)	70
-carunculata (Gunung Gadud, Sumatra)	60	-veitchii (Sungai Samba, Lowland)	80
-edwardsiana ssp. macrophylla (G. Trusmadi)	@	-ventricosa	20
-eymai (Gunung Lumut, Sulawesi)	70	-vieillardii (New Caledonia)	30
-ephippiata (Gunung Raya, Borneo)	120	-villosa	@
-gracilis	20	Nepenthes Manmade Hybrids	
-gracillima (Gunung Ulu Kali)	60	-bicalcarata x khasiana	25
-gymnamphora	30	-(x"Mixta") x gracilis	20
-inermis (Gunung Gadud, Sumatra)	120	-talangensis x hamata	30
-khasiana	25	-ventricosa x dubia	30
-lowii (Gunung Mulu)	80	-ventricosa x inermis	25
-lowii (Gunung Trusmadi)	80	-ventricosa x mapuluensis	25
-macfarlanei (Gunung Ulu Kali)	40	-ventricosa x maxima	20
-madagascariensis	30	-ventricosa x spectabilis	25
-masoalensis	80	Heliamphora	
-maxima	25	-heterodoxa	30
-maxima (wavy leaves, Sulawesi)	40	-ionasii (true one!!!)	200
-mirabilis (giant form, Sulawesi)	30	-minor	40
-mirabilis	15	-tatei var. tatei (!!!)	180
-muluensis (Gunung Mulu)	60	-nutans (Form from Tramen)	80
-pervillei	50	-nutans (Tramen) x ionasii	80
-pilosa (Batu Lawi, Borneo)	120	Heliamphora Manmade Hybrids	
-rafflesiana	20	-heterodoxa x ionasii (own cross)	60
-rajah	60	-heterodoxa x minor	50
-reinwardtiana (green, Sumatra)	25	-heterodoxa x nutans	30
-sanguinea (Genting highlands)	30	Cephalotus	
-tentaculata (Gunung Raya, Borneo)	40	-follicularis	20
-thorellii	30		
-tobaica	20		
-tomoriana (Lampia, Sulawesi)	50		
-truncata	80		

How to order:

If you want to order any plants, please send me your order. I will then in return send a proforma-invoice for the plants which are available. Please do not send any money before having received a proforma-invoice. After having received the money I will apply for documents or directly send the plants. I charge DM 25 for postage, DM 20 for CITES and DM 10 for phytosanitary certificates.

US-customers: You do not have to care about import-regulations. Your plants will be sent via Mr. Henning von Schmeling who has import permits. Therefor there are no CITES-/phyto-charges for US-customers.

Five new taxa of *Nepenthes* (Nepenthaceae) from North and West Sumatra.

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Andreas Wistuba, Mudauer Ring 227, 68259 Mannheim, Germany

During three field trips in 1986, 1989 and 1992 we examined several locations of Nepenthaceae in West and North Sumatra. We further studied herbarium specimens at the herbaria of Leiden (The Netherlands) and Bogor (Indonesia).

From these studies we concluded to describe five new taxa of Nepenthaceae including four new species. From the Lake Toba region in North Sumatra we describe a new species, which is closely related to *Nepenthes carunculata*, but differs in some morphological features that justify the establishment of a new taxon. Two new species related to *Nepenthes dubia* and *Nepenthes inermis*, and one, which is related to *Nepenthes rafflesiana* and *Nepenthes sumatrana*, all from West Sumatra are described. From our studies on *Nepenthes carunculata* at different locations we further decided to describe a new variety.

Nepenthes talangensis Nerz et Wistuba spec. nov.

Folia mediocria, sessilia, lamina spathulato-lanceolata, nervis longitudinalibus utrinque 3-5, basi cordata semiamplexicauli, vagina 0. Ascidia rosularum magnitudine mediocria infundibuliformia, alis 2 fimbriatis; peristomio operculum versus acuminato, in collum breve elevato, 8-15 mm lato, costis 1/3-1 mm distantibus, dentibus 1 x longioribus quam latis; operculo ovato, facie inferiore plano. Ascidia superiora magnitudine mediocria, infundibuliformia costis 2; peristomio operculum versus acuminato, in collum breve elevato, 8-15 mm lato, costis 1/3-1 mm distantibus; dentibus 2-3 x longioribus quam latis. Operculo ovato facie inferiore plano. Inflorescentia racemus parvus, pedicellis 8-9 mm longis omnibus 1-floris. Indumentum in partibus vegetativis parcum, margo laminae pubescens.

Holo-Typus: Nerz 2501, short vine with flower and pitcher, G. Talang, 2200 m, W-Sumatra, 06.09.1986 (L).

Plants usually growing as rosettes and only rarely climbing. Climbing stems reaching up to 2-3 m high, the part with adult leaves 6-10 mm thick, cylindrical to obtusely angular, internodes 0.5-10 cm long, leaves of the rosettes and climbing stems thick, coriaceous sessile, lanceolate-spathulate, about 10-15 cm long, up to 3 cm broad, apically acute or obtuse, attenuate towards the base, leaves clasping the stem, not decurrent; Pennate nerves, irregularly reticulate, on each side several (10-15) originating irregularly from the midrib, longitudinal nerves running parallel in the outer 1/3 part of the lamina. Tendrils usually without curl, once to twice as long as the lamina. Pitchers of the rosettes originating with a short curve, 5 mm wide from the hanging end of the tendril, thick-coriaceous, widely infundibuliform, 8-12 cm high, 3-5 cm wide, somewhat contracted below the mouth, with 2 fringed wings. The wings 2-5 mm wide, the fringe segments 3-10 mm long, 0.5-1.0 mm apart; mouth almost horizontal in front, elevated towards the lid and elongated into a short neck. Peristome flattened, 8-15 mm wide, the ribs 1/3-1 mm apart, the teeth of the inner margin 2-3 times as long as broad. Innerside of the pitcher wholly glandular with a glandless triangle below the lid. Large slightly overarched glands, 300/cm² in the lower part of the pitcher, smaller ones, 500/cm² in the upper part. Lid broadly ovate, undulate at the margin. Lower surface without appendage, with rather large glands, especially near

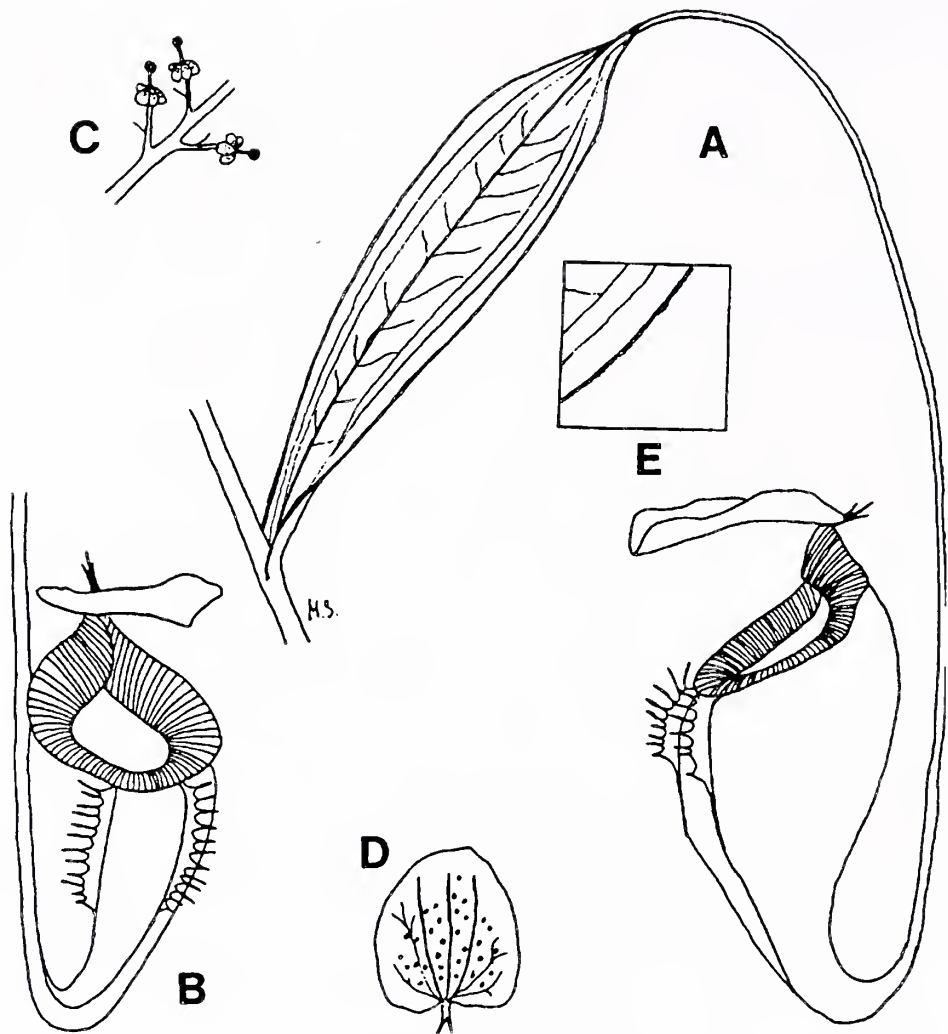


Fig. 1 *Nepenthes talangensis* (Nerz et Wistuba) A. leaf and pitcher of climbing stem (x 318); B. ground pitcher (x 1/2); C. part of male inflorescence (x 3/4); D. lid (x 0,5); E. part of leaf (x 1).

the midrib, glandless near the margin. Three prominent nerves on each side of the midrib. Spur broad and flattened, 2-5 mm long, branched, inserted close to the lid. Pitchers of the climbing stems originating with a short curve, 5 mm wide from the hanging end of the tendril, thick-coriaceous, tubulous to narrow infundibuliform in the lower half, ovate in the upper half, 8-12 cm high, 3-5 cm wide, somewhat contracted below the mouth, with 2 prominent ribs; mouth almost horizontal in front, elevated towards the lid and elongated into a short neck. Peristome flattened, 8-15 mm wide, the ribs 1/3-1 mm apart, the teeth of the inner margin 2-3 times as long as broad. Interior surface of the pitcher wholly glandular with a glandless triangle below the lid. Large, slightly overarched glands, 300/cm² in the lower part of the pitcher, smaller ones, 500/cm² in the upper part. Lid broadly ovate, undulate at the margin. Lower surface

without appendage, with rather large glands, especially near the midrib, glandless near the margin. Three prominent nerves on each side of the midrib. Spur broad and flattened, 2-5 mm long, branched, inserted close to the lid. Male inflorescence a raceme, the peduncle 4-5 mm long, 1-1,5 mm thick, the axis 6-8 cm long, obtusely angular, the pedicels all of them 1 flowered, the lower ones 10 mm long, the upper ones a little shorter, almost all of them with a filiform bract, up to 4 mm long. Tepals elliptical to oblong, 4 mm long. Staminal column, the anthers included, 3-4 mm long. Female inflorescence unknown. Indumentum on the vegetative part very sparse with non branched hairs, margin of the leaves, densely covered with non branched hairs. Indumentum of inflorescence very sparse. Colour of herbarium specimens: Brown to dark-brown. Colour of living specimens: Vegetative parts light green, leaves with white hair at the margins, pitchers yellowish-white with numerous dark red spots. Peristome yellow or red, lid yellowish white with numerous red spots.

Distribution and ecology:

West Sumatra, Gunung Talang, 2200 m-2600 m altitude.

In alpine regions above the tree-zone, usually growing as rosettes and short shoots at the ground, sometimes climbing between scrubs like *Rhododendron*. Nepenthaceae growing on the same mountain are *Nepenthes inermis*, *N. carunculata* and *N. gymnamphora*, which all grow in different habitats at lower altitudes. Hybrids with *N. inermis* were observed.

Notes:

Danser, according to data given in his monograph of 1928, examined material of this species (Bünnemeijer 2552 (L); Bünnemeijer 5398 (L); Bünnemeijer 6740 (BO)). Erroneously he placed these specimens under *Nepenthes bongso*. Recent field studies of *Nepenthes talangensis* at G. Talang by Nerz in 1986 and of *Nepenthes bongso* at G. Singgalang by Mr. and Mrs. DeWitte in 1993 (pers. com.) showed clearly that both are distinct species. This was also confirmed by the studies of available herbarium-material of *Nepenthes talangensis* (The Bünnemeijer specimens cited above) and herbarium-material of *Nepenthes bongso* (Gunung Merapi, Korthals s. n. (L, Type); Gunung Singgalang, Beccari 268 (L)). See table 1 for a comparison of distinct characters of both species and other similar species.

Nepenthes tenuis Nerz et Wistuba spec. nov.

Planta tenuis. Folia mediocria sessilia lamina lanceolata, nervis longitudinalibus utrinque 3, basi attenuata 2/3 caulis amplexante. Vagina 0. Ascidia rosularum et inferiora ignota. Ascidia superiora parva, infundibuliformia, costis 2 elevatis; peristimio operculum versus acuminate in collum breve elevato, 6 mm lato, costis 1/8 mm distantibus; operculo anguste elliptico, facie inferiore plano. Inflorescentia ignota.

Holo-Typus: Meijer No 6949, Taram, sandstone region of river Tjampo on ridge, 1000 m, 24.08.1957, H.L.B. No 958.86.006 (L).

Stems climbing, slender, the climbing part of the stem angular to rhomboid, 2-3 mm thick, the internodes 5-6,5 cm long. Rosettes and basal part of the stem unknown. Leaves of the climbing stems scattered, thin-coriaceous, sessile, lanceolate 5-6 cm long, 1-1,5 cm broad, acute, attenuate at the base, clasping the stem for 2/3 without sheath. Nervation indistinct, the pennate nerves oblique, irregularly reticulate, the longitudinal ones about 3 on both sides originating from the basal 1/3 part of the midrib running parallel in the outer 1/2 of the lamina. Tendrils 1,5 x as long as the lamina, 0,5-1 mm thick, usually without curl. Indumentum sparse. Pitchers of the climbing stems gradually originating from the hanging end of the tendril incurved with a 10 mm wide curve, widely infundibuliform, contracted under the mouth 2,5-4,5 cm high, 1,5-2,5 cm

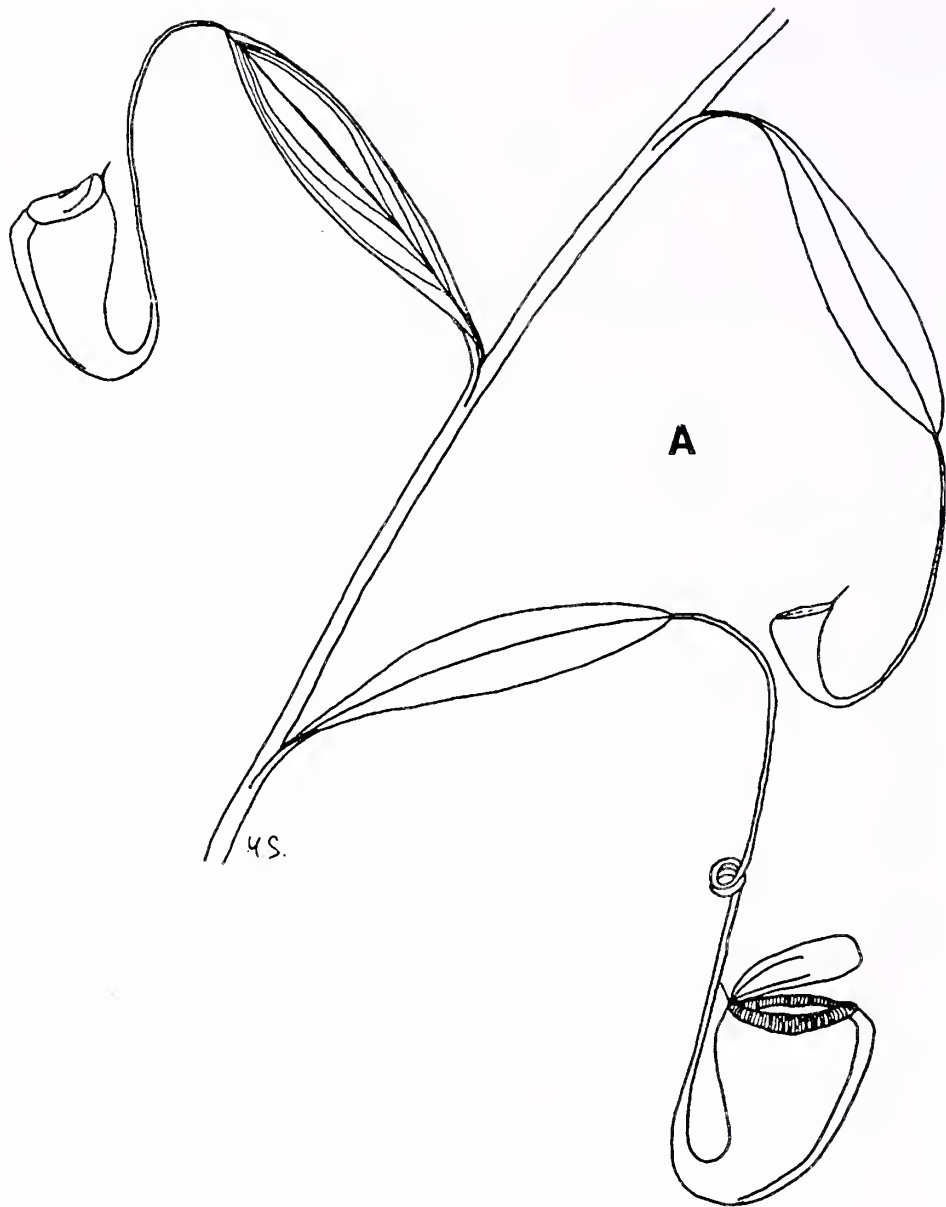


Fig. 2 *Nepenthes tenuis* (Nerz et Wistuba) A. Upper part of climbing stem (x3/4).

wide. 2 prominent ribs, 3-5 mm apart without fringes. Mouth ovate, almost horizontal, peristome flattened 6 mm wide, the ribs 1/8 mm apart. Inner surface of the pitcher with numerous small glands, about 600-800 on 1 cm². Lid narrow-elliptic 1,5-2,5 cm long, 0,5-0,8 cm wide with 2 prominent nerves, one on each side of the midrib. Glands evenly distributed on the underside of the lid. Spur unbranched, up to 1 mm long inserted close to the lid. Colour of herbarium specimens: dark brown Colour of living specimens: Pitchers with red-brown dots, peristome dark red-brownish.

Distribution and Ecology:

According to W. Meijer this species was found growing near Taram, West Sumatra, at a sandstone region of river Tjampo on a ridge at 1000 m altitude.

Notes:

This species is only known from the type collection by W. Meijer. It has not been recollected yet.

In table 1 we show some characteristics which clearly distinguish *Nepenthes tenuis* from similar species.

Tab. 1.

Characteristics distinctive for *N. talangensis*, *N. tenuis*, *N. bongso* and *N. dubia***.

	<i>N. talangensis</i>	<i>N. tenuis</i>	<i>N. bongso</i>	<i>N. dubia</i>
Shape of upper pitchers	tubulous to narrow infundibuliform in the lower half, ovate in the upper half	wide infundibulate, contracted below the mouth	tubulate-infundibulate	tubulous in the lower part, infundibulate above the middle
Lid	broad-ovate	very narrow elliptical	orbiculate	narrow cuneate
Length/width ratio of upper pitchers	2,3	1,75	3,3	1,9

Specimens examined:

N. dubia: Bunnemeijer 938 G. Talakmau 1800 m, 29.05.1917, H.L.B. 320 256 164 (L); Bunnemeijer 938, G. Talakmau 1800 m, 29.05.1917 (BO).

N. bongso: Beccari 268 1878, G. Singgalang 1700 m, H.L.B. 908.155-85 (L); Junghuhn, Res. Tapiannoeli: G. Loebokraja, 1900 m, 11.1840 or 1841, H.L.B. 908.155-870 (L); Korthals, G. Merapi 2500 m, TYPE, H.L.B. 908.155-867 (L); Korthals legit, Sumatra (B ex L); Korthals legit, Sumatra (M ex L).

N. talangensis: Bunnemeijer 2552, G. Talang, 7.11.1918 H.L.B. 822.60.920 (L); Bunnemeijer 5398, G. Talang 2200 m, 02.11.1918 (L); Bunnemeijer 6740, Bt. Gombak, 2330 m, 16.11.1918 (BO); Nerz 2501 (Holo-Type), short vine with flower and pitcher, G. Talang, 2200 m, W-Sumatra, 06.09.1986 (L); Nerz 2502, leaf and pitcher of vine, alcohol-material, G. Talang, 2200 m, W-Sumatra, 06.09.1986 (L); Nerz 2503, leaf and pitcher of rosette, G. Talang, 2200 m, W-Sumatra, 06.09.1986 (L).

N. tenuis: Meijer No 6949 (Holo Type), Taram, sandstone region of river Tjampo on ridge, 1000 m, 24.08.1957, H.L.B. No 958.86.006 (L).

Nepenthes longifolia Nerz et Wistuba spec. nov.

Folia mediocria, lamina oblonga vel lanceolata, nervis longitudinalibus utrinque 3-4, basi in alas 2 decurrense; Ascidia rosularum mediocria, parte inferiore ventricosa os versus cylindrica, alis 2 fimbriatis; ascidia facie ventrali sub peristomio elevata quomodo peristomio inter alis distinctissime undulato, operculum versus acuminato et elevato, ad 6 mm lato, costis 0,2 mm distantibus, dentibus 0. Operculo orbiculari, facie inferiore plano. Ascidia superiora magna, e parte inferiore anguste infundibuliformi tubulosa, costis 2 prominentibus, ascidia facie ventrali sub peristomio elevata quomodo peristomio inter alis distinctissime undulato, operculum versus acuminato et elevato, ad 6 mm lato, costis 0,2 mm distantibus, dentibus 0. Operculo orbiculari, facie inferiore plano. Inflorescentia racemus, pedicellis 1-1,2 cm longis, omnibus 2-floris.

Indumentum parcum breve patens.

Holo-Typus: Nerz 2801, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L).

Stems climbing, often up to 10 m; part with adult leaves cylindrical 5-6 mm thick. Leaves of the rosette and short shoots lanceolate, sometimes lanceolate-spatulate, up to 50 cm long, obtuse, gradually attenuate into a short at most 5 cm long petiole, laterally flattened sheath clasping the stem for about 2/3. Pennate nerves numerous, indistinct, reticulate. The longitudinal ones 3-4 each side, running parallel in the outer half of the leaf. Tendrils shorter or up to as long as the lamina, without curl. Pitchers of the rosette very shortly incurved from the hanging tendrils, ventricose in the lower part, cylindrical in the upper part, up to 12 cm high, up to 4-5 cm broad in the lower part, up to 2-3 cm broad in the upper part, with two fringed wings over nearly the whole length. The wings about 3-4 mm broad, the fringe-segments 5-6 mm long, 1-3 mm apart. Mouth oblique, elevated and acuminate towards the lid. Peristome flattened, 6 mm wide, distinctly raised and usually slightly crumpled in front up to 5 mm on the sides, the ribs 0,2 mm apart. The interior margin entire. Inner surface of the pitcher glandular in the ventricose part with 500 overarched glands/cm². Lid orbicular, 2-3 cm in diameter, the interior surface without appendages, with large round to ovate glands towards the midrib, glandless towards the margin. Spur non-branched, up to 1 cm long. Leaves of the climbing stems lanceolate up to 30 cm long, 4-5 cm broad, ending in a distinct 6-7 cm long petiole, decurrent in two narrow wings, 1-2 mm wide, over almost the whole length of the internode. Pennate nerves numerous, indistinct, reticulate. The longitudinal ones 3-4, on each side, running parallel in the outer half of the leaf. Tendrils shorter or up to as long as the lamina, often with curl. Pitchers of the climbing stem gradually originating from the hanging end of the tendril, incurved with a curve up to 4 cm wide, narrowly infundibuliform in the lower half, tubulose in the upper half, 18-25 cm high, 2,5-3,5 cm wide with two prominent ribs over the whole length. Mouth oblique, elevated and acuminate towards the lid. Peristome flattened up to 6 mm wide, distinctly raised and crumpled in front with 3 prominent folds, up to 5 mm on the sides, the ribs 0,2 mm apart. The interior margin entire. Inner surface of the pitcher glandular in the infundibulate part with 500 overarched glands/cm². Lid orbicular, 2-3 cm in diameter, the interior surface without appendages, with large, round to orbicular glands towards the midrib, glandless towards the margin. Spur non-branched, up to 1 cm long. Male flower a raceme. Peduncle 15-20 cm long, about 3 mm thick at the base, 1 mm thick at the top, the axis 10-12 cm long, pedicels all of them two-flowered, without bract, up to 1-1,2 cm long. Tepals narrow elliptical 4-5 mm long. Staminal column 5 mm long, the anthers included. Female inflorescence unknown. Indumentum sparse, with stellate hairs. Margin of the leaves densely covered with red hairs. Colour of herbarium specimen: leaves greenish brown, pitchers brown. Colour of living specimen: Leaves green, underside sometimes reddish, leaves of the rosette often with a red midrib. Lower pitchers brownish red, peristome usually green to reddish-green, inside of the pitcher pale green, lid red. Pitcher of the climbing stem light green.

Distribution and ecology:

Growing on ridges of Gunung Tjampo near Payakumbuh, West Sumatra. The species was found growing in light submontaneous forest at 1000 m altitude. The plants were growing in several patches disjunct from each other. Other *Nepenthaceae* growing on Gunung Tjampo are *Nepenthes alata*, *N. albomarginata* and *N. reinwardtiana*. Hybrids with *Nepenthes alata* were observed.

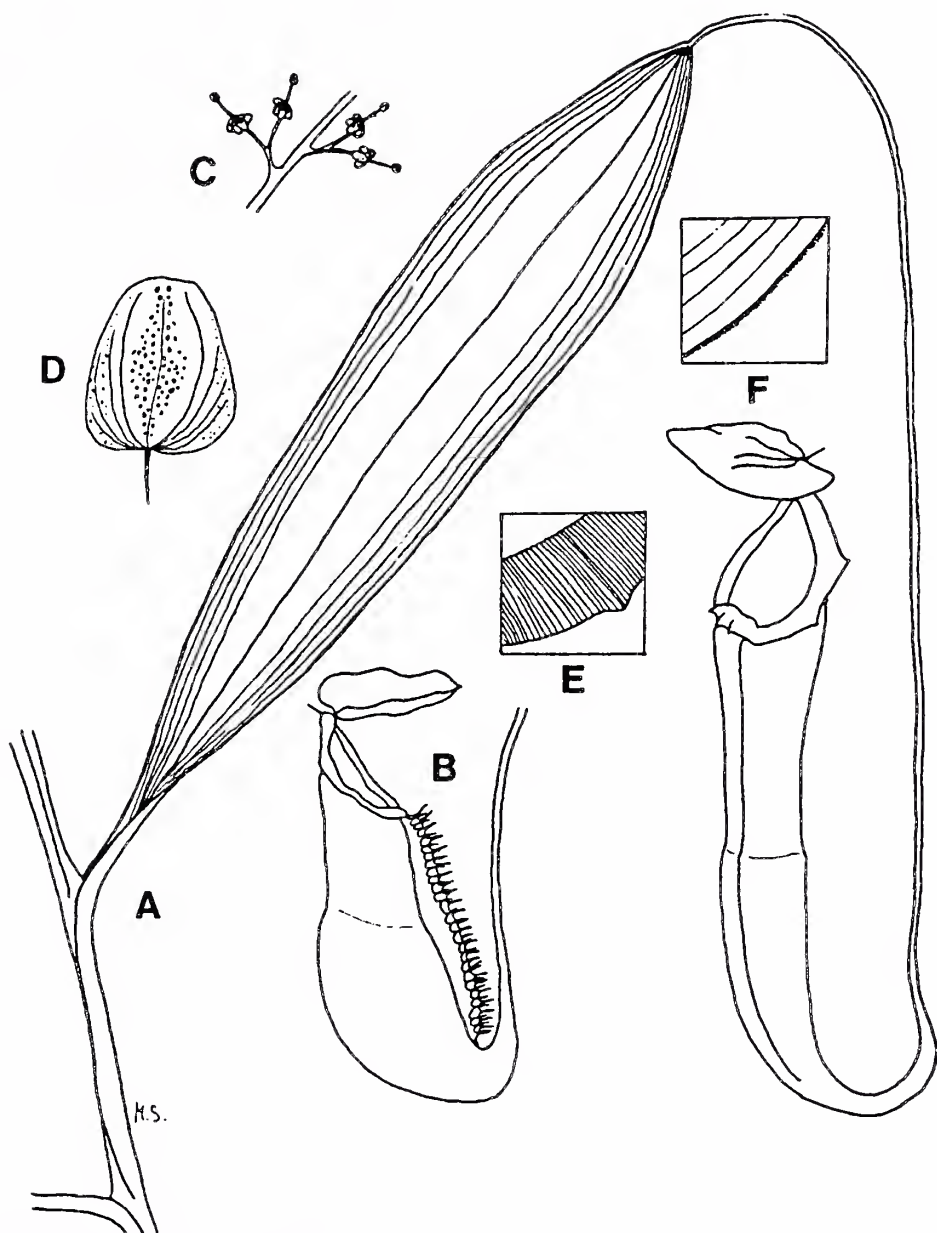


Fig. 3 *Nepenthes longifolia* (Nerz et Wistuba) A. leaf and pitcher of climbing stem (x 3/10); B. ground pitcher (x 1/2); C. part of male inflorescence (x 2/3); D. lower side of lid (x 1/2); E. part of rim (x 2); F. part of leaf (x 3/4).

Notes:

The species has been found by J. Nerz on Gunung Tjampo in September 1992. Specimens which might represent the same species were collected in 1956 by W. Meijer in the same area.

In table 2 we show some characteristics which clearly distinguish *N. longifolia* from similar species.

Tab. 2.

Characteristics of *N. longifolia* compared to similar species.

	<i>N. longifolia</i>	<i>N. rafflesiana</i>	<i>N. sumatrana</i> *
Shape of lower pitcher	ventricose in the lower part, tubulous in the upper part	rounded at the base, conical in the upper part	globose or broad ventricose in the lower part, tubulous in the upper part
Shape of upper pitcher	narrow infundibulate in the lower, tubulous and glandless in the upper part	infundibulate, without tubulous glandless part	infundibulate, without tubulous glandless part
Flowers	always two-flowered	one-flowered	one- or two-flowered

* Recollections of *N. treubiana* at the type-locality (Wistuba) and of *N. sumatrana* (Nerz et Wistuba) showed clear morphological differences between these two species. Therefore we follow the nomenclature of Beck (1895), who elevated *N. sumatrana* to specific rank. It was originally described as *N. boschiana* var. *sumatrana* by Miquel (1858) and recombined as *N. maxima* var. *sumatrana* by Beccari (1886).

Specimens examined:

***N. longifolia*:** Meijer No 6913, Taram, sandstone region of river Tjampo, 500-1000 m, forest against slope of river-valley, 24.08.1957, H.L.B. 958.85 111 (L); Nerz 2801 (Holo-Type), Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L); Nerz 2802, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L); Nerz 2803, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L); Nerz 2804, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L); Nerz 2805, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (L); Nerz 2806, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (TUB); Nerz 2807, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (TUB); Nerz 2808, Tjampo-Mountains, near Taram, alt. 1000 m, W-Sumatra, 25.09.1992 (TUB).

***N. sumatrana*:** Teysmann 535, Sibolga, coast, W.-Sumatra, 01-09.02.1856, type of *N. boschiana* var. *sumatrana*, H.L.B. 928.350-86 (L); Teysmann 535, Sibolga to Tarutung, km 33, 02.1856 (BO).

Nepenthes ovata Nerz et Wistuba spec. nov.

Folia mediocria, sessilia. lamina angusta lanceolata, spatulata, apicem versus acuminata. Basi subcordata semiamplexicaulis. Vagina 0. Ascidia rosularum ovato conica, alis 2 fimbriatis, peristomio operculum versus elevato acuminato expanso 15-40 mm lato, costis 0,5-1,5 mm distantibus, dentibus 5x longioribus quam latis. Operculo cordato-ovato, facie inferiore prope basin appendice lateralter applanata obsito. Ascidia superiora magnitudine mediocria infundibuliformia, costis 2 prominentibus. Peristomio operculum versus acuminato in collum breve elongato, applanato, antice 2-5 mm, operculum versus 5-20 mm lato. Costis distantibus 0,5-1 mm, dentibus 5 x longioribus quam latis. Operculo cordato-ovato, facie inferiore prope basin appendice lateralter applanata obsito. Inflorescentia racemus longus, pedicellis inferioribus 10-15 mm longis, fere omnibus 2-floris. Indumentum in partibus vegetativis parcissimum.

Holo-Typus: Nerz 1601, rosette with pitchers, G. Pangulubao, alt. 1800m, N-Sumatra, 16.03.89 (L).

Stems climbing, cylindrical, 4-6 mm thick, internodes 4-15 cm. Leaves of the

climbing stem scattered, sessile to broad-petiolate, lanceolate-spathulate, 5-12 cm long at the basis 1-1.5 cm, at the middle part 2-3 cm wide. Tendril insertion of leaf-tip apical. Apex of the leaf abruptly narrowing into an acute tip, 0.8-1.2 cm long. Nerves longitudinal, 3 on each side, originating from the midrib near the base, in the outer 1/2 part of the lamina, meeting at the apex of the leaf. Leaves of the rosette sessile to broad petiolate, lanceolate-spathulate, 10-15 cm long, at the base 1 cm at the middle part 2-3 cm wide. Tendril insertion of leaf-tip apical, abruptly narrowing into an acute tip, 1-5 mm long. Rosette pitchers abruptly originating from the end of the tendril, pitcher ovate, infundibulate in the lower part, widest near the mouth, slightly narrowed towards the mouth. Pitchers usually 10-15 cm, sometimes up to 25 cm in length, 5-6 cm wide, sometimes up to 9 cm. With two prominent wings, 2-5 mm wide over the whole length. Fringes 3-10 mm long, 1-5 mm apart. Often the wings are reduced to ribs, bearing fringes only in the upper part of the pitcher. Mouth oblique, strongly incurved, acuminate and hanging over towards the lid, elongated into a triangular neck. Peristome expanded 3-7 mm broad in front, 15-25 mm or rarely up to 40 mm broad towards the lid. The ribs 0.5-1.5 mm apart at the outer side, teeth at the inner margin. Teeth of the inner margin in front of the mouth 1-3 mm long, towards the lid 1-7 mm long, teeth towards the lid broader. Inner surface almost wholly glandular, only a glandless triangle under the lid. Inner surface in the lower part with 400 overarched glands/cm² and 1300 overarched glands/cm² in the upper part. Lid at the midrib elevated to a laterally flattened glandular claw-shaped crest up to 5 mm in length. Pitchers of younger plants sometimes without distinct crest. Spur up to 5 mm in length, branched. Pitcher with 14-18 longitudinal nerves. Upper pitchers rather abruptly originating from the hanging end of the tendril. The curve 20-30 mm wide on the innerside, the ascending part usually tubulate-infundibuliform, 12-18 cm in length, in the tubular part 1.5-2 cm broad, 5-6 cm at the widest part, slightly narrowing towards the mouth. 2 non-prominent ribs over the whole length. Mouth oblique incurved, acuminate towards the lid. The ribs 0.5-1.0 mm apart at the outer site, with teeth at the inner margin. Pitcher with 14-18 longitudinal nerves. Inner surface almost wholly glandular, in the lower part with 400 overarched glands/cm², and 1300 overarched glands/cm² in the upper part. Lid: the midrib elevated to a laterally flattened, glandular, non branched appendage up to 5 mm in length with rather large glands especially near the midrib and at the appendage. Male inflorescence: A raceme, peduncles 4 cm in length, axis (without peduncle) 5 cm in length, slender, about 2 mm thick at the base. The pedicels all one-flowered with a filiform bract about as long as the pedicel. At the lower part, the pedicels are about 5 mm in length, at the upper part about 5 mm in length. Tepals ovate lanceolate about 3 mm long, 2 mm broad. Staminal column about 4 mm long the one-seriate anthers inclusive. Female inflorescence and seed unknown. Indumentum sparse with non branched hairs. Colours of the living specimens: Lower pitchers green, older pitchers suffused with red. Rim dark red, sometimes striped with green. Upper pitchers yellow, rim red with yellow stripes.

Ecology:

North-Sumatra, West-ridge of G. Pangulubao, 1800 m, in wet mossy forest at open places, often growing in *Sphagnum* moss, the vines climbing into small trees. The plants were found growing in a rich mountain flora.

Other Nepenthaceae growing on the same mountain are *Nepenthes spectabilis*, *Nepenthes rhombicaulis* and *Nepenthes tobaica*. *Nepenthes spectabilis* is growing more scattered in montaneous forest at about the same altitude. Hybrids with *Nepenthes spectabilis* and *Nepenthes rhombicaulis* were observed.

Notes:

Nepenthes ovata from the Lake-Toba region shows characters clearly distinct from the related *Nepenthes carunculata* and is geographically isolated from all locations of *Nepenthes carunculata* known so far.

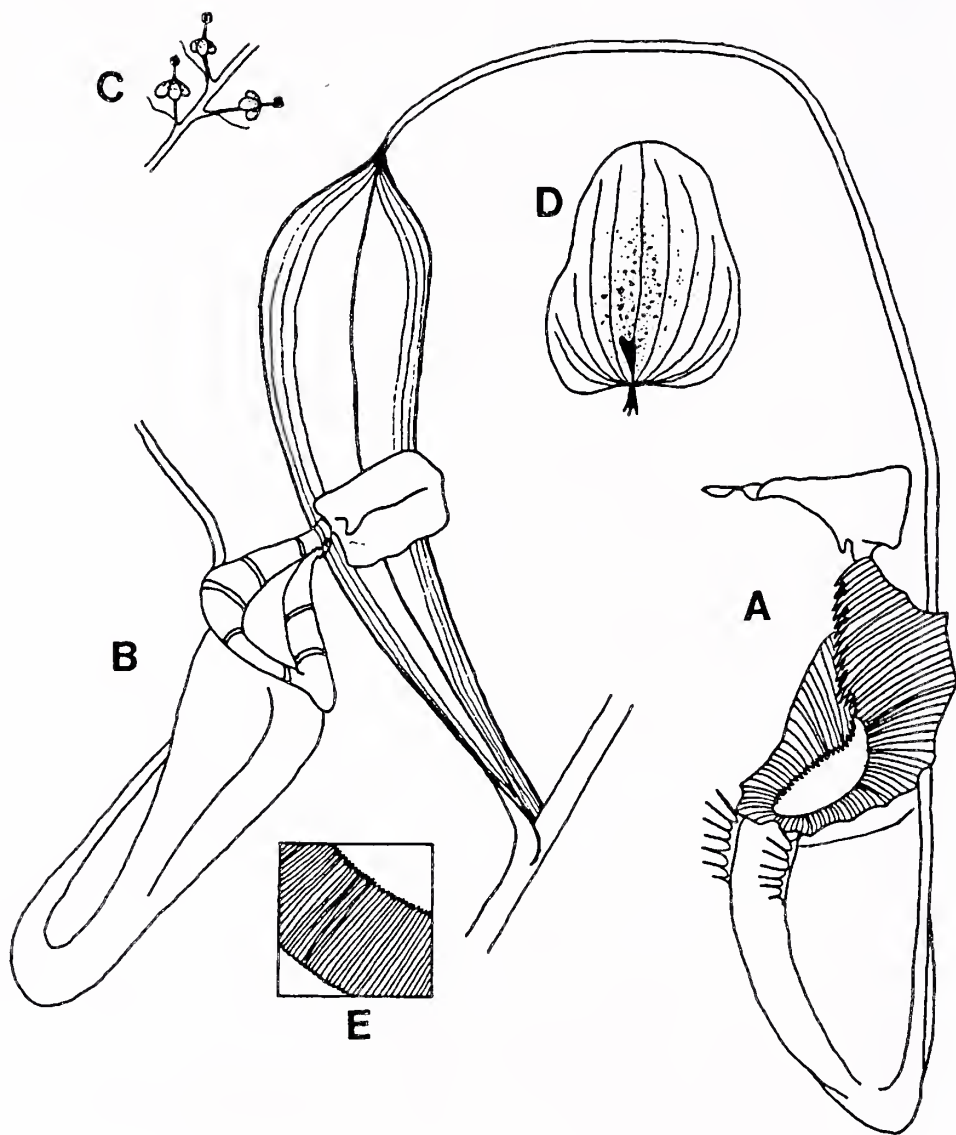


Fig. 4 *Nepenthes ovata* (Nerz et Wistuba) A. leaf and pitcher of lower part of the stem (x 1/2); B. pitcher of climbing stem (x 1/3); C. part of male inflorescence (x 3/4); D. lower side of lid (x 1/2); E. part of rim from upper pitcher (x 1,5).

Tab. 3.

Characteristics of *Nepenthes ovata* compared to related species**.

	<i>N. ovata</i>	<i>N. carunculata</i>	<i>N. singalana</i>
Apical appendix of the operculum	"	usually irregular glandular appendix near the apex of the lid	"
Basal crest of the operculum	glandular, claw-shaped crest near the basis of the lid	"	"
Leaf apex	acuminate, apex abruptly narrowing into a distinct triangle	emarginate-peltate, leaf apex rounded	rounded
Glands of operculum	glandular near the midrib, densely glandular near and on the claw shaped crest	densely glandular near the midrib of the operculum, obviously large glands on the appendage and in the surrounding	sparsely glandular near the midrib, no glands near the apex
Glandular zone inside the pitcher	ending always immediately beneath the peristome, leaving only small triangular glandless zone	cylindrical glandless part of the pitcher usually well established	cylindrical glandless part of the pitcher always well established
Insertion of operculum	peristome incurved, lid insertion above the middle of the pitcher-mouth	bend of peristome not prominent, lid not inserted above the pitcher mouth	bend of peristome not prominent, lid not inserted above the pitcher mouth
Peristome teeth	clearly visible at the inner margin of the mouth	facing towards the inner wall of the pitcher and therefore barely visible	clearly visible at the inner margin of the mouth

Specimen examined:

N. ovata: Nerz 1601 (Holo-Type), rosette with pitchers, G. Pangulubao, alt. 1800m, N-Sumatra, 16.03.89 (L); Nerz 1602, vine with pitchers and male flowers, G. Pangulubao, alt. 1800m, N-Sumatra, 16.03.89 (L); Nerz 1603, vine with male flowers, G. Pangulubao, alt. 1800m, N-Sumatra, 16.03.89 (L).

N. carunculata: Bünnemeijer 4027, G. Sago, 2000 m, 26.07.1918 (BO); Bünnemeijer 4230, G. Malintang, 1700 m, 01.08.1918 (BO); Bünnemeijer 5747, Bt. Gombak, 2330 m, 16.11.1918, H.B. No 929 18 135 (BO); Bünnemeijer 9696, G. Kerintji, 1800 m, 16.04.1920 (BO); Meijer 4571, Mt. Sago, 1800 m, 15.12.1956, H.L.B. 957.274-792 (L); Meijer 6142, Mt. Sago, 1700-1800 m, 19.06.1958 (L).

N. singalana: Bünnemeijer 4028, G. Sago, 2000 m, 26.07.1918 (BO); Bünnemeijer 4113, G. Malintang, 2000 m, 29.07.1918 (BO); Bünnemeijer 4114, G. Malintang, 2200 m (BO); Bünnemeijer 4179, G. Malintang, 2200 m, 01.08.1918 (BO); Bünnemeijer 10270, G. Kerinci, 07.05.1920 (BO); Meijer 3590, Mt. Sago, northern slope, open facies, mossy forest, Payakumbuh, 1800-1900 m, 29.06.1955 (L); Meijer 5841, Mt. Singgalang, surrounding of crater lake, subalpine veg., 2800m, 26.05.1957 (L); Schiffner, iter indicium 1991, G. Merapi, 2500 m, 30.07.1894 (WU); Schiffner, G. Singgalang, summit, 2750 m, 25.07.1918 (L); Schiffner, iter indicium 1990, G. Singgalang, summit 2750 m, 25.07.1894 (WU).

***Nepenthes carunculata* var. *robusta* Nerz et Wistuba var. nov.**

Differt a typo caracteribus sequentibus:

Planta robusta. Lamina lato-spathulata, 2,5 x longioribus quam lata, apice peltata, margo laminae distincte undulatum.

Holo-Typus: Nerz 2401, rosette with pitchers, G. Gadut, mossy forest, alt 1800 m, W-Sumatra, 06.03.1989 (L).

This variety is characterized by its robust appearance. The rosette-leaves are up

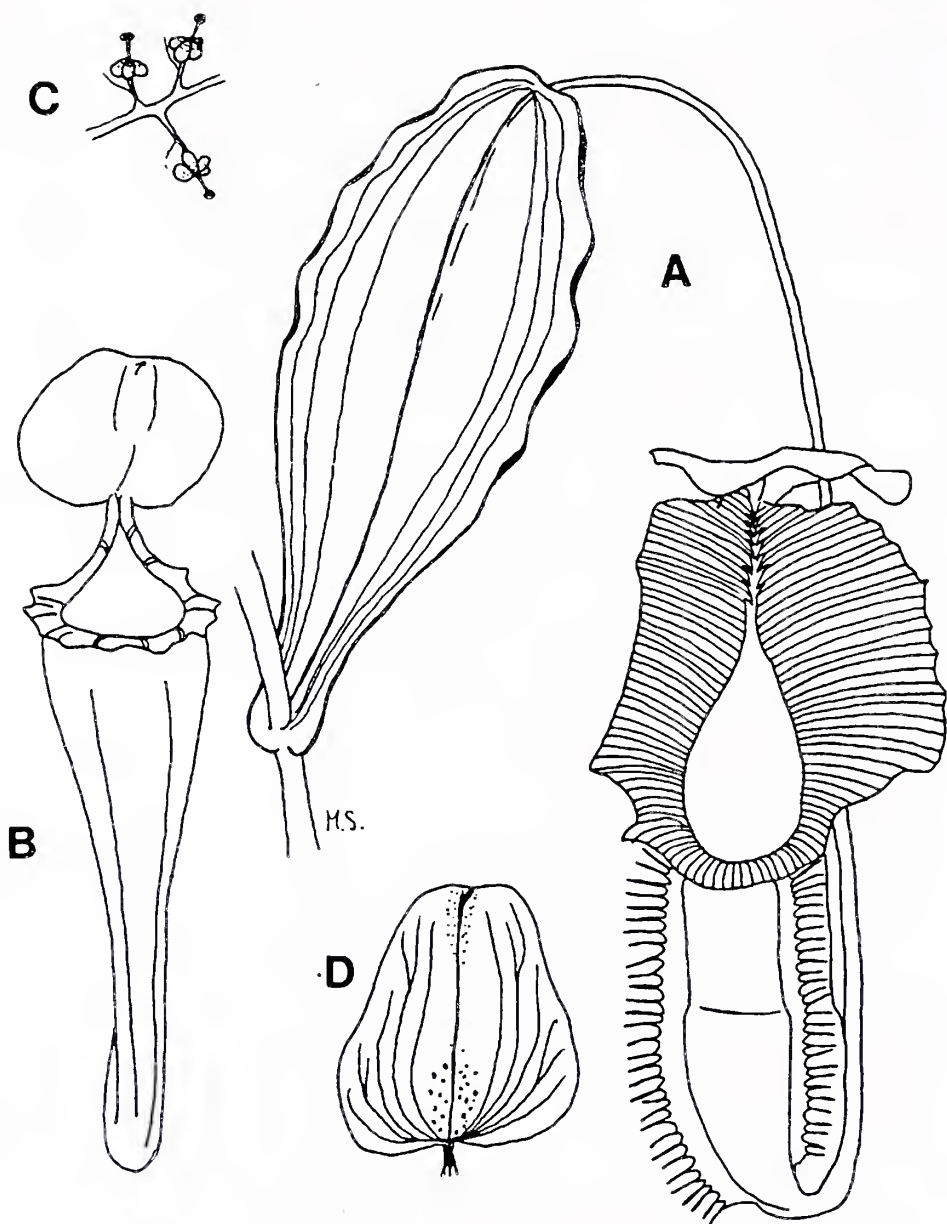


Fig. 5 *Nepenthes carunculata* var. ***robusta*** (Nerz et Wistuba) A. leaf and pitcher of lower part of the stem (x 2/5); B. pitcher of climbing stem (x 3/8); C. part of male inflorescence (x 3/4); D. lower side of lid (x 1/2).

to 2,5 x as long as wide. The margins of the leaves are undulate and the tendril is usually inserted up to 1 cm below the apex of the lamina. The peristome of the rosette-pitchers is extremely prominent, up to 4 cm wide.

Ecology and distribution:

Gunung Gadut, 1800 m, open places in mossy forest. *Nepenthes inermis* and *Nepenthes gymnamphora* are growing together with this species in the same habitat. Hybrids with *Nepenthes inermis* and *Nepenthes gymnamphora* were observed.

Specimens examined:

N. carunculata var. **robusta**: Nerz 2401 (Holo-Type), rosette with pitchers, G. Gadut, mossy forest, alt 1800 m, W-Sumatra, 06.03.1989 (L); Nerz 2402, vine with pitchers, G. Gadut, mossy forest, alt 1800 m, W-Sumatra, 06.03.1989 (L).

Colour slides of living specimens growing in their natural habitat have been submitted to the photo-collection of the Rijksherbarium in Leiden for *Nepenthes carunculata*, *N. carunculata* var. *robusta*, *N. dubia*, *N. longifolia*, *N. ovata*, *N. singalana*, *N. talangensis* and *N. sumatrana*.

******We do not agree with the opinions of Tamin and Hotta who made some suggestions for nomenclatural changes among Sumatran species of *Nepenthes*. They unite the taxa *Nepenthes inermis*, *Nepenthes bongso*, *Nepenthes dubia* and *Nepenthes talangensis* (e.g. Bünnemeijer 5398 from Gunung Talang) into one taxon, *Nepenthes bongso* (Tamin and Hotta, 1986, page 83). Further Tamin and Hotta unite *Nepenthes carunculata*, *Nepenthes singalana*, *Nepenthes spathulata* and others to one taxon, *Nepenthes singalana* (Tamin and Hotta, 1986, page 98). After having studied the representative type-specimens and specimens growing in the wild we feel that these nomenclatural changes are not justified. Besides the new taxon *Nepenthes talangensis* we therefore use the nomenclature of Danser (1928) in this publication which is generally accepted among botanists.

Remark:

We want to thank Don Schnell and Steve Baker who gave us the opportunity to publish the first validating descriptions which ever appeared in CPN. We feel that CPN is a very good organ for this matter, since it is well established among botanists and enthusiasts dealing with carnivorous plants.

Acknowledgements:

We want to thank Matthias and Oliver Schmidt who prepared the illustrations for this paper. We are grateful to the staff of the herbaria in Leiden (L) and Bogor (BO) for the opportunity to study their specimens of Nepenthaceae.

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News And Views

Through August 1995, a small carnivorous plant display will be housed at the University of Wisconsin - Whitewater natural history museum, Upham Hall, third floor. The display features representatives of the following genera: *Sarracenia*, *Drosera*, *Dionaea*, *Pinguicula*, *Utricularia* and *Nepenthes*. If in the Whitewater area, please stop by and visit during the building open hours of 7:30 am to 6:00 pm weekdays.

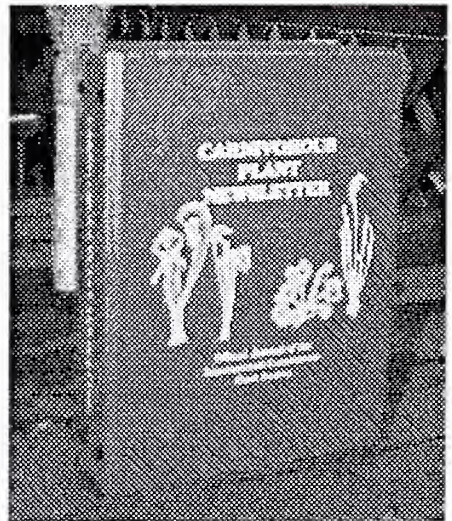


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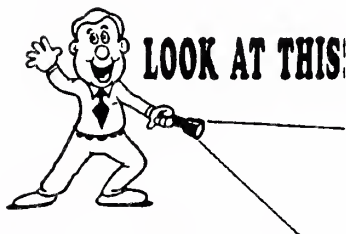
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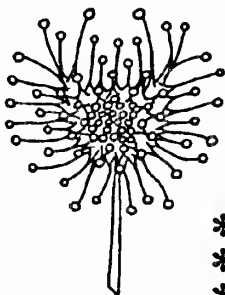
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I'm wondering if anyone is interested in the creation of a *Nepenthes* dating service. The system would allow more species breeding and, hopefully, cut down on all the haphazard hybridizing. If you are interested or have comments, please contact Tom Johnson at (818) 248-1623 or PO Box 12281, Glendale, CA 91224-0981.

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The List of Nepenthes Hybrids Raised In Kosobe Bot.Garden.
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Raiser:-DR.K.KAWASE

YEAR	HYB.NO.	FANCY NAME	PARENT	REMARKS
1974	1	Aslow Koto	thorelii X thorelii	
"	2	Accentual Koto	thorelii X hookeriana	
"	3	Ambrosial Koto	trichocarpa X hookeriana	
1975	4	Balmy Koto	thorelii X maxima	
"	10	Benign Koto	rafflesiana X Fukakusana	
1977	15	Dainty Koto	thorelii X merrilliata	
"	16	Dashy Koto	mixta X merrilliata	Syn.#67
"	25	Decorous Koto	rafflesiana X hookeriana	
"	26	Delectable Koto	rafflesiana X thorelii	
"	27	Delightful Koto	trichocarpa X Fukakusana	
"	28	Dignified Koto	trichocarpa X Dyeriana	
"	31	Dinkum Koto	wrigleyana X maxima	
"	32	Divine Koto	wrigleyana X veitchii	
"	35	Dreamy Koto	thorelii X veitchii	
1978	39	Easeful Koto	mirabilisX Fvkakvsana	
"	40	Ebony Koto	mirabilis X hookeriana	
"	42	Ecstatic Koto	thorelii X maxima	Syn.#4
"	44	Effulgent Koto	mirabilis X thorelii	
"	47	Elaborative Koto	thorelii X Dyeriana	Syn.#48:84
"	49	Elfine Koto	thorelii X Tsujimoto	
"	51	Emotional Koto	wrigleyana X thorelii	Syn.#75
"	52	Engaging Koto	wrigleyana X hookeriana	
"	53	Eternal Koto	wrigleyana X Dyeriana	
1979	58	Fabulous Koto	hasiana X thorelii	
"	60	Facetious Koto	thorelii X Accentual Koto	
"	62	Facile Koto	Mastersiana X thorelii	
"	64	Felicitous Koto	Aglow Koto X thorelii	
"	66	Feminine Koto	hasiana X Aglow Koto	
"	68	Fervent Koto	mirabilis X Accentual Koto	
1979	71	Festal Koto	mixta X merrilliata	Syn.#16
"	73	Festive Koto	Aglow Koto X Balmy Koto	
"	76	Feverish Koto	Mastersiana X merrilliata	
"	77	Fickle Koto	Mastersiana X hookeriana	
"	82	Fine Koto	Balmy Koto X hookeriana	
"	88	Forceful Koto	wrigleyana X fusca(?)	
"	90	Foremost Koto	Balmy Koto X Dyeriana	
"	92	Formal Koto	rafflesiana X fusca(?)	
"	94	Frosty Koto	Balmy Koto X fusca(?)	
"	95	Fruity Koto	Aglow Koto X Fukakusana	
"	96	Fulgent Koto	thorelii X fusca(?)	Syn.#97
"	98	Festive Koto	Aglow Koto X Balmy Koto	Syn.#73
1980	124	Giddy Koto	hasiana X hookeriana	
"	137	Glaring Koto	Coccinea X rafflesiana	
"	138	Glazy Koto	Coccinea X thorelii	Syn.#156
"	139	Glorious Koto	Coccinea X Balmy Koto	
"	141	Glossy Koto	mirabilis X Balmy Koto	
1982	155	Igneous Koto	thorelii X Dreamy Koto	
"	163	Immobile Koto	Mixta X thorelii	
1983	—	Zonal Koto	ventricosa X alata(?)	Nat.Hyb.

< KOTO meaning old capital (KYOTO)>

Note: List submitted by Isamu Kusakabe. He is one of the old Nepenthes gurus in Japan.
Also thanks to Dr. Kawase for permitting us to print it in CPN



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Artists, Authors, Correspondents, and Photographers Index

- | | |
|-----------------------------|---|
| Antor, R.J. 88 | Mellichamp, Larry 91 |
| Atlanta Botanical Garden 32 | Meyers, Joey 91 |
| Baker, Steve 91 | Meyers-Rice, Barry 11, 15, 19, 33, 34, 36, 40, 86 |
| Baldwin, Andy 91 | Middlesteadt, L.A. 60 |
| Bednar, Bruce 91 | Milauskas, Paul 4 |
| Bramblett, Clyde 60, 91 | Miller, T. 89 |
| Bressler, David 91 | Mitchell, R.S. 89 |
| Buell, Chet 91 | Moretz, Craig 91 |
| Cheek, Martin 69, 95 | Munn, Ed 91 |
| Church, Robert 91 | Nerz, Joachim 101 |
| Cochran, Brian 91 | Nethery, Bill 91 |
| Cohen, Marcia R. 58, 86 | Novotna, Regina 94 |
| Crump, Dave 91 | Paget, Andrew 33 |
| Cumbee, Joe 91 | Pierson, Bruce 42 |
| Degreef, J.D. 88 | Powell, Jim 91 |
| Denmon, Ginger 91 | Rollins, Kyle 91 |
| Determann, Ron 91 | Sarcolotto, Bob 91 |
| Dodd II, Cliff 91 | Schmid-Hollinger, Rudolf 62 |
| Dudley, Bruce 91 | Schnell, Donald E. 23, 30, 49, 90, 91 |
| Evans, Dave 91 | Scholl, Bill 91, 99 |
| Earley, L.S. 8, 9 | Sheridan, Philip M. 52, 53, 99 |
| Freedman, B. 88 | Smith, Jay 91 |
| Fitzgerald, Bryan 91 | Snively, Kevin 91 |
| Gagliardo, Ron 32, 91 | Snyder, Ivan 58 |
| Garcia, M.B. 88 | Soloman, Alex 91 |
| Gardner, Rob 52 | Strong, Mark T. 53 |
| George, Richard H. 38 | Studnicka, Miloslav 93 |
| Gibson, Robert 43, 74 | Szesze, Michael 64 |
| Gon III, Sam 68 | Tanneberger, William 91 |
| Hanrahan, Bob 91 | Taylor, Carl and Sherry 91 |
| Herrera, Manny 91 | Teo, Chris KH 53 |
| Hood, Gerry 65 | Thomas, Darwin 91 |
| Johnson, Ozzie 91 | Troup, Randy 91 |
| Johnson, Tom 91 | Truman, Tommy 91 |
| Judziewicz, EJ 8 | U.S. Fish and Wildlife Service. 53 |
| Kawase, Dr.K. 116 | Van Der Wiele, Cynthia 91 |
| Koch, RG 8 | von Schmeling, Henning 91 |
| Kusakabe, Isamu 116 | Welch, Jeff 91 |
| Lauffenburger, Arthur 91 | Williams, Chad 6 |
| Legatski, Eric 32 | Williams, S.E. 89 |
| Lesseigne, Todd 91 | Wilson, Brad 91 |
| Levy, Mike 91 | Wistuba, Andreas 101 |
| Lowrie, Allen 89 | Young, Malcolm 95 |
| McCaffery, Michael W. 91 | Zacek, Zdenek 66, 67 |
| Mann, Phill 6 | Zielinski, Jim 91 |

Title Index

Announcement	99
Are Genlisea Traps Active? A Crude Calculation	40
Byblis - A Botanical Problem Once Again	93
Call For Articles And Photos	5
Carnivorous Plant Wordsearch	64
Carnivorous Plants In Fiordland National Park , New Zealand	9
Carnivorous Plants Of New Zealand: A Review	74
Carnivorous Plants Of The Esperance Region, Western Australia	43
Carnivorous Plants Of Whangamarino Swamp New Zealand	6
Cattle As Sarracenia Stewards?	49
CP Paradise In The Bush	42
CPN Binders	114
Don't Confuse Sphagnum Moss With Peat Moss	65
Five New Taxa Of Nepenthes (Nepenthaceae) From North and West Sumatra.	101
Focusing On U. Uniflora—A Butterfly Look Alike	11
Focusing On U. Gibba—The “U” Stands For Ubiquitous!	19
Focusing On U. Prehensilis—An Inquisitive Plant	34
Focusing On Utricularia—U. delicatula And U. lateriflora	15
Growing Carnivorous Plants In A Semi-Arid Climate	38
Growing Terrestrial Genlisea	36
ICPS Seedbank	3, 31, 59, 87
Letter From The Czech Republic — II	67
Literature Review	8, 52, 82, 88
More Knowledge About Nepenthes Rhombicaulis	62
Nepenthes Dating & Mating	89
Nepenthes Hybrid Crosses	4
News And Views	6, 32, 60, 114
Oops!	61
Sarracenia Conservation Conference	23
Southeastern Section Meeting — September, 1994	90
Special Notice	55, 83
The Correct Names For The Subspecies Of Sarracenia purpurea L.	69
The Hawaii Population Of Drosera Anglica— A Tropical twist on a temperate theme	68
The Limonium Peregrinum Of Carolus Clusius	95
The List of Nepenthes Hybrids Raised in Kosobe Bot. Garden	116
Want Ad	4



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